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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,724	12/28/2004	Franz Laermer	10191/3980	5180

26646 7590 10/01/2007

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EXAMINER	
DHINGRA, RAKESH KUMAR	
ART UNIT	**PAPER NUMBER**
1763	

NOTIFICATION DATE	DELIVERY MODE
10/01/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@kenyon.com

Office Action Summary	Application No.	Applicant(s)	
	10/519,724	LAERMER, FRANZ	
	Examiner	Art Unit	
	Rakesh K. Dhingra	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant has amended claims 14 by adding new limitation "a first gas, a second gas selected to react with first the gas to form chlorine trifluoride when under the influence of a high density plasma".

Claims 14-26 are currently pending and active.

Further, response to applicant's arguments is given hereunder.

Claims 14, 15 - Applicant's argument that Yanagisawa et al. do not disclose, or even suggest, employing gases that react with one another under the influence of a high-density plasma to form chlorine triflueride has not been found persuasive, because Yanagisawa et al teach a high density plasma reactor (for example, Figures 1, 9, 10) wherein first and second gases 31, 32, 33 are supplied to the plasma discharge tube 2 (for example, paragraphs 0044-0082), as per claim 14 limitations. Further, claim limitation "a first gas and a second gas selected to react with the first gas to form chlorine trifluoride under the influence of high density plasma"is an intended use limitation, and since the prior art apparatus meets all the structural limitations of the claim, the same is considered capable of meeting the intended use limitation. Therefore, claim 14 and dependent claims 15-19 have been rejected as explained below.

Claims 20, 22, 25, 26 - applicant's arguments, that Bhardwaj in view of Comita and Charlet do not teach high density plasma method for generating chlorine trifluoride is found persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of new reference Ye et al in view of Bhardwaj et al and Comita, since the combination of references teaches on limitation of claim 20. Applicant's argument that Comita teaches away from using plasma generated radicals is not found persuasive since Comita also teach that higher radical density is obtained for plasma generated radicals as compared to the radicals generated by thermal activation, which in turn higher etch rate (Ye et al – column 13, lines 52-65). Accordingly claims 20-22, 25 and 26 have been rejected under 35 USC 103 (a) as explained below. Balance claims 23 and 24 have also been rejected under 35 USC 103 (a) as explained below.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 14, 16-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Yanagisawa et al (US PGPUB No. 2001/0007275).

Regarding Claims 14, 16: Yanagisawa et al teach a plasma apparatus (Figure 1) comprising:

A discharge tube 2 (plasma reactor) with plasma generating means (including magnetron 10, waveguide 11 with tuner 14, isolator (normally includes circulator) 15 and reflection plate (terminator) 13, by which plasma can be generated in the discharge tube 2, gas supply means (including gas bombs 31, 32, 33 and gas flow controllers 34, 35, 36) via which a first and a second gas are supplied to the discharge tube 2 (plasma reactor), and reactive species generated due to reaction of two gases under high density plasma, are supplied to the process chamber via the gas pipe 20 at its outlet 20a (paragraphs 0044-0053).

Applicant has invoked 35 USC 112 sixth paragraph in respect of claim limitations a) "plasma generating means" as included in specification at page 11, lines 10-37 {including a microwave waveguide 150, magnetron 170, terminator 180, circulator 160, tuner 155). The structure of prior art as disclosed above is similar to the plasma generating means disclosed by the applicant;

b) gas supply means as included in specification at page 4, lines 25-30 {including gas bottles 21, 25 and mass flow regulators 22, 26). The structure of prior art as disclosed above is similar to the gas supply means as disclosed by the applicant.

Further, claim limitations pertaining to a first gas and a second gas selected to react with the first gas to form chlorine trifluoride is an intended use limitation, and since the prior art apparatus meets all the structural limitations of the claim, the same is considered capable of meeting the intended use limitation.

In this connection courts have ruled:

> A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Regarding Claim 17: Yanagisawa et al teach the plasma reactor includes a tube 2 made from aluminum oxide (paragraph 0049).

Regarding Claim 18: Yanagisawa et al teach gas supply means with flow controllers 34, 35, 36 by which the quantities of first and second gases supplied are adjustable (paragraphs 0050, 0063).

Regarding Claim 19: Yanagisawa et al teach an etching apparatus (Figure 1) comprising processing chamber 6 connected to plasma reactor 2 via gas outlet 20a, and substrate W is situated in the process chamber 6 and is exposed to excited gases generated by the plasma reactor 2. Further, claim limitation pertaining to generation of gaseous chlorine trifluoride is an intended use limitation, and since the prior art apparatus meets all the structural limitations of the claim, the same is considered capable of meeting the intended use limitation.

Claim 14, 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Mahawili (US patents 6,783,627, which incorporates US patent No. 5,814,365)

Regarding Claims 14, 15: Mahawili teaches a plasma apparatus (Figures 2-6) comprising:

A plasma generator 114 (plasma reactor) with plasma generating means (including RF coil, matching network 124 and HF power supply 122), by which plasma can be generated in the plasma generator 114, gas supply means (including plurality of gas injection tubes 46 with flow control regulators – as per column 7, lines 5-15, of US Patent No. 5,814,365 - Mahawili) via which a first and second gas could be supplied to the plasma generator, and reactive species are supplied via the gas outlet (outlet pipe of plasma generator) [column 3, line 30 to column 6, line 63 and column 8, line 58 to column 9, line 20].

Applicant has invoked 35 USC 112 sixth paragraph in respect of claim limitations a) "plasma generating means" as included in specification at page 9, line 34 to page 10, line 30 {including an RF coil 110, high frequency generator 130 and matching network 120). The structure of prior art is similar to the plasma generating means disclosed by the applicant;

b) gas supply means as included in specification at page 4, lines 25-30 {including gas bottles 21, 25 and mass flow regulators 22, 26). The structure of prior art as disclosed above is similar to the gas supply means as disclosed by the applicant.

Further, claim limitations pertaining to a first gas and a second gas selected to react with the first gas to form chlorine trifluoride is an intended use limitation, and since the prior art apparatus meets all the structural limitations of the claim, the same is considered capable of meeting the intended use limitation.

In this connection courts have ruled:

> A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 20-22, 25, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ye et al (US Patent No. 5,756,400) in view of Bhardwaj et al (WO 00/51938) and Comita et al (US Patent No. 6,042,654).

Regarding Claims 20, 21: Ye et al teach a method for dry-clean etching of chamber internal surfaces, wherein a first gas (fluorine containing gas) and a second gas (chlorine containing gas) are introduced in a high density inductively coupled plasma reactor (Figure 2), and the plasma generated species react with residues on chamber internal surface and clean the same (for example, column 7, line 10 to column 8, line 5 and column 11, line 62 to column 15, line 15).

Ye et al do not explicitly teach method of generating ClF3 by the reaction of first and second gases under the influence of high density plasma.

Bhardwaj et al teaches a method for generating chlorine trifluoride (ClF3) using:

A reaction chamber 2 for formation of ClF3;

First gas (Chlorine) supply 3 and second gas (Fluorine) supply 4 for supplying reactant gases to the reaction chamber, wherein ClF3 is produced in the reaction chamber by reaction between chlorine and fluorine at a high temperature of about 400 degrees C and supplied to a process chamber 1 to be used for further processing of substrates. Bhardwaj et al also teach that ClF3 provides improved etch capability and dry chamber cleaning. Further, Bhardwaj et al also teach method of using ClF3 plasma for etching applications, wherein the gases are mixed in a mixing manifold before entry into plasma chamber, and under the action of plasma the radicals and charged particle fluxes are generated that carry out the wafer processing, similar to using ClF3 itself (for example, Figures 1-3 and page 8, line 21 to page 12, line 25).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to use ClF3 generated by mixing a first gas (fluorine containing gas) and a second gas (chlorine containing gas) as taught by Bhardwaj et al in the method of Ye et al to provide improved etch and chamber clean capability.

Ye et al in view of Bhardwaj et al do not explicitly teach method of producing ClF3 by the reaction of first and second gases under the influence of high density plasma.

Comita et al teach a method for cleaning chamber deposits using chlorine radicals where chlorine radicals are thermally generated. Comita et al further teach that when the radicals are generated by plasma, higher radical density about 1 X 10.sup.14 per cm3 is obtained (as in a high density plasma) as compared to when the radicals are thermally generated. Comita et al also teach that instead of chlorine radicals, chlorine trifluoride (ClF3) could also be used to provide similar results (for example, column 6, lines 40-65 and column 8, lines 52-62). It would be obvious to use ClF3 generated by reaction of first and second gases under the influence of high density plasma in view of teachings of Comita et al, and Ye et al in view of Bhardwaj et al to obtain improved chamber cleaning by providing higher density of ClF3 radicals.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to generate ClF3 under the influence of high density plasma as taught by Comita et al in the method of Ye et al in view of Bhardwaj et al to obtain higher density of ClF3 radicals for improved chamber cleaning.

Regarding Claim 22: Bhardwaj et al teach that chlorine and fluorine are used for generating ClF3 (page 8, line 21 to page 9, line 5).

Regarding Claim 25: Bhardwaj et al teach the ratio of fluorine to chlorine atoms as 65-85 % fluorine and 15-35 % chlorine (that is, about 3: 1, as per claim limitation) [page 11, lines 10-21].

Regarding Claim 26: Comita et al teach that density of plasma radicals is 1 X 10.sup.14 (meets the claim limitation of at least 10.sup.12 particles per cm3).

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ye et al (US Patent No. 5,756,400) in view of Bhardwaj et al (WO 00/51938) and Comita et al (US Patent No. 6,042,654) as applied to claims 20-22, 25, 26 and further in view of Mori et al (US Patent No. 6,136,214).

Regarding Claim 23: Ye et al in view of Bhardwaj et al and Comita et al teach all limitations of the claim except oxygen being supplied as an additional gas to plasma reactor or to the process chamber.

Mori et al teach a method for etching silicon oxide film on semiconductor substrates using ClF3 as an etching gas and where oxygen was also supplied as an additional gas (column 20, lines 5-18).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use oxygen as an additional gas supplied to the process chamber as taught by Mori et al in the apparatus of Ye et al in view of Bhardwaj et al and Comita et al for enhancing selective etching of silicon oxide films (column 20, lines 30-38).

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ye et al (US Patent No. 5,756,400) in view of Bhardwaj et al (WO 00/51938) and Comita et al (US Patent No. 6,042,654) as applied to claims 20-22, 25, 26 and further in view of Ikeda et al (US Patent No. 6,953,557).

Regarding Claim 24: Ye et al in view of Bhardwaj et al and Comita et al teach all limitations of the claim except a filter downstream from the plasma reactor for separating HF.

Ikeda et al teach a method where harmful gases like HF are removed from the etching gases like ClF3 using a removing apparatus (like a filter). Further, these removing apparatus (like stirring tank 5) are installed down stream of the plasma reactor (exhaust line 1) [column 1, lines 15-35 and column 4, lines 10-60).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use filter for separating/treating gases like HF as taught by Ikeda et al in the apparatus of Ye

et al in view of Bhardwaj et al and Comita et al to separate out harmful components from the etching gases like ClF3.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Rakesh K. Dhingra

Kaila Moore
Primary Examiner
Art Unit 1763